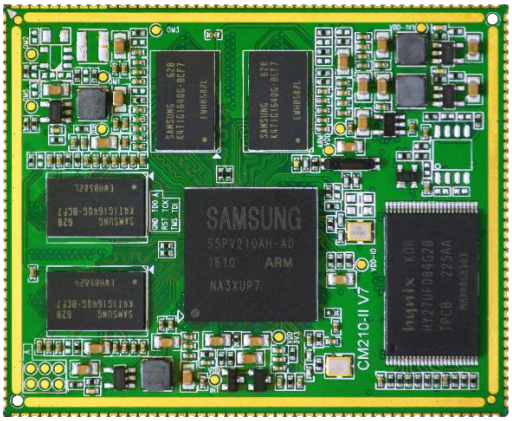
CM210-II Reference User Manual

V7



Boardcon Embedded Design

www. armdesigner. com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com, www.armdesigner.com).

These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

Content

1 About the Module

1.1 Summary

CM210-II is System on Module (SOM) based on the Samsung's S5PV210AH-A0 application processor with ARM Cortex-A8 core in small size, powerful 3D accelerator full HD (1080P) and high-performance HW multimedia.

The module is perfect combination of minimum size, low cost and high performance.

Stable electrical performance, Successful mass production. applicable to MID, POS, PND, and Terminal controller.

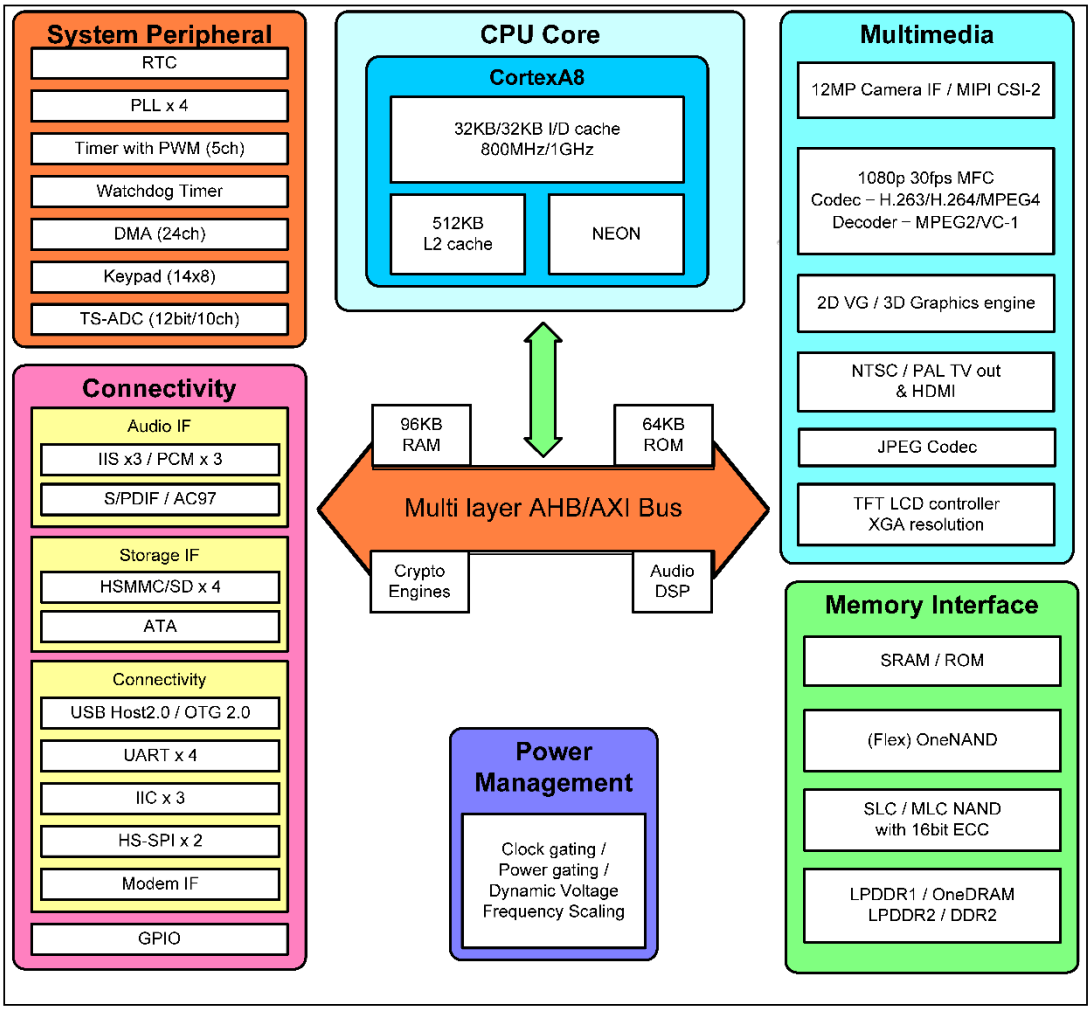
1.2 Features

- CPU
  - Samsung S5PV210AH-A0，1GHz，ARM Cortex A8 Core
  - 64KB I&D Cache, 512KB L2 Cache
  - PowerVR SGX540 3D Graphics Engine
  - HD Mult-Format video codec(MPEG2, MPEG4, H.264, Divx, VC-1)
- RAM
  - On-board 512MB DDR2-RAM
  - 64bit data bus
  - DDR clock frequency as high as 200MHz
- ROM
  - On-board SLC or MLC 256MB Nand Flash
  - Up to 16GB
- POWER
  - high-efficiency DC-DC converter
  - 5V & 3.3V Power input
- RTC
- HDMI 1.3 output (up to 1080P)
- TV output
- AC97 AUDIO interface
- Watchdog
- Boot mode setting
- 4 UART
  - 2 Three line and 2 Five line
  - Support IrDA
- 1 IIC interface(CH1)
- 1 HS-SPI interface
- SDIO interface
  - 2 4bit SDIO or 1 8bit SDIO
  - Boot in SDIO CH0

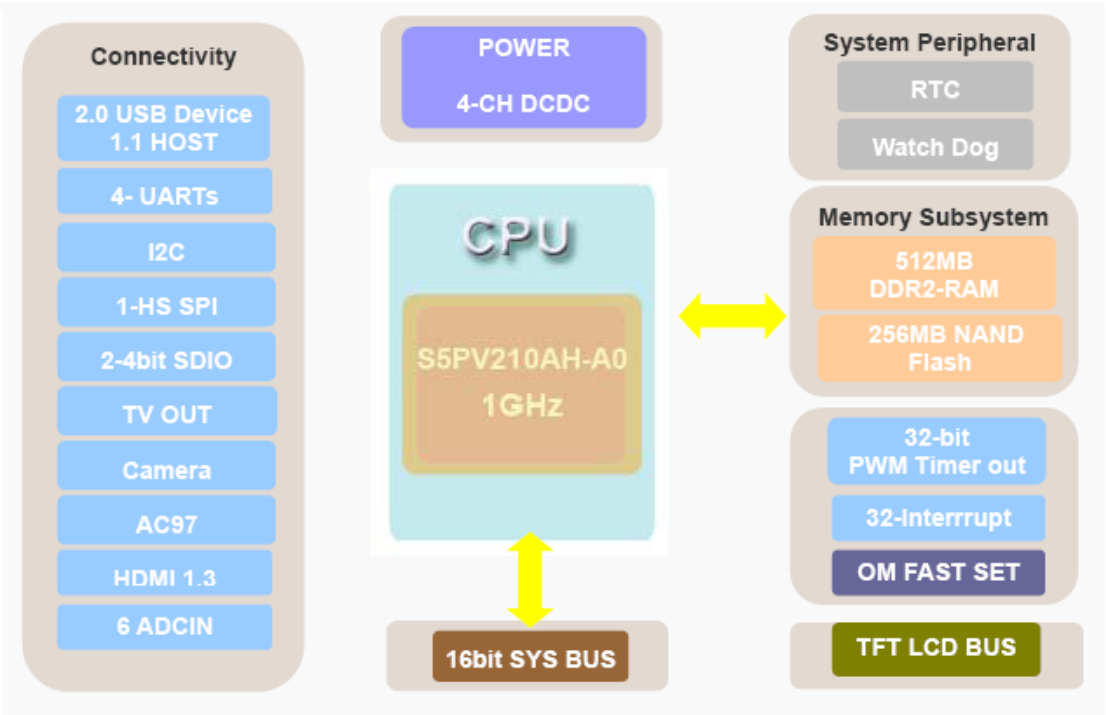
- 6 12bit ADIN or 2 ADIN and 4 wire RES-touch panel interface
- 32 interrupt sources
- 2 2.0 USB interface (OTG and HOST)
- 1 32bit PWM Timer out
- 1 Camera interface
  - Max 8192 x 8192 pixels input
  - ITU601/656 8bit support
- TFT LCD BUS
  - 24BPP RGB parallel output
  - PIP(OSD) function
- 16bit system BUS

1.3 Block Diagram

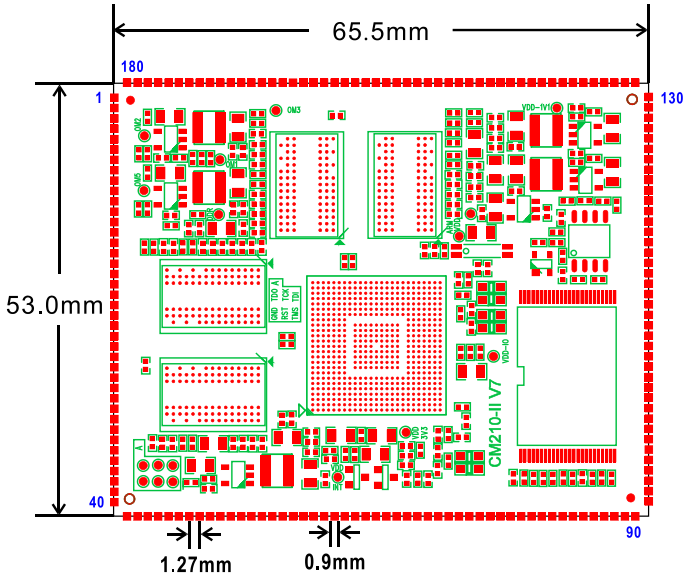
1.3.1 S5PV210 Block Diagram



1.3.2 CM210-II Block Diagram



1.4 PCB Dimension



1.5 Pin Definition

Pin	Signal name	Function	Description	IO Type
1	DCIN	5V Power in	Can connect to 3.7V Li battery	P
2	DCIN	5V Power in	Can connect to 3.7V Li battery	P

Pin	Signal name	Function	Description	IO Type
3	DCIN	5V Power in	Can connect to 3.7V Li battery	P
4	VDD_IO	3.3V Power in		P
5	VDD_IO	3.3V Power in		P
6	VDD_ARM	ARM Power test pin		P
7	VDD_INT	INT Power test pin		P
8	VDD_MEM	Memory Power test pin		P
9	VDD_RTC	RTC battery in	Must be connct to Battery or 3.3V	P
10	GND	Ground		P
11	PWREN	XPWRRGTON	Power control	O
12	EINT9	EINT9/GPH1_1		I/O
13	OTG_ID	XuoID	USB OTG mini-Receptacle Identifier	I/O
14	XOTG_DP	XUOTGDP	USB OTG Data pin DATA+	I/O
15	XOTG_DM	XUOTGDM	USB OTG Data pin DATA-	I/O
16	XVBUS	XUOTGVBUS	USB OTG mini-Receptacle Vbus	I/O
17	DRV_VBUS	XUOTGDRVVUBS	USB OTG charge pump enable	O
18	USBH_DP	XUHOSTDP	USB HOST Data pin DATA+	I/O
19	USBH_DN	XUHOSTDM	USB HOST Data pin DATA-	I/O
20	EINT11	EINT11/GPH1_3		I/O
21	HDMI_CEC	EINT12/GPH1_4	Defined for HDMI CEC signal	I/O
22	SD0DATA0	SD0DATA0/GPG0_3	SD0 interface DATA0	I/O
23	SD0DATA1	SD0DATA1/GPG0_4	SD0 interface DATA1	I/O
24	SD0DATA2	SD0DATA2/GPG0_5	SD0 interface DATA2	I/O
25	SD0DATA3	SD0DATA3/GPG0_6	SD0 interface DATA3	I/O
26	SD0CLK	SD0CLK/GPG0_0	SD0 interface Clock	I/O
27	SD0CMD	SD0CMD/GPG0_1	SD0 Command/Response	I/O
28	SD0CDn	SD0CDn/GPG0_2	SD0 Card Detect	I/O
29	EINT7	EINT7/GPH0_7		I/O
30	SD1DATA0	SD1DATA0/GPG1_0	SD1 interface DATA0	I/O
31	SD1DATA1	SD1DATA1/GPG1_1	SD1 interface DATA1	I/O
32	SD1DATA2	SD1DATA2/GPG1_2	SD1 interface DATA2	I/O
33	SD1DATA3	SD1DATA3/GPG1_3	SD1 interface DATA3	I/O
34	SD1CLK	SD1CLK/GPG1_4	SD1 interface Clock	I/O
35	SD1CMD	SD1CMD/GPG1_5	SD1 Command/Response	I/O
36	SD1CDn	SD1CDn/GPG1_6	SD1 Card Detect	I/O
37	EINT8	EINT8/GPH1_0		I/O
38	HDMI_HPD	EINT13/GPH1_5	Defined for HDMI HPD signal	I/O
39	EINT14	EINT14/GPH1_6		I/O
40	EINT15	EINT15/GPH1_7		I/O
41	TSXM	ADCIN8	Used for TS_XM	I
42	TSXP	ADCIN9	Used for TS_XP	I
43	TSYM	ADCIN6	Used for TS_YM	I
44	TSYP	ADCIN7	Used for TS_YP	I

Pin	Signal name	Function	Description	IO Type
45	EINT16	EINT16/GPH2_0	OR KP_COL0	I/O
46	EINT17	EINT17/GPH2_1	OR KP_COL1	I/O
47	EINT18	EINT18/GPH2_2	OR KP_COL2	I/O
48	EINT19	EINT19/GPH2_3	OR KP_COL3	I/O
49	EINT20	EINT20/GPH2_4	OR KP_COL4	I/O
50	EINT21	EINT21/GPH2_5	OR KP_COL5	I/O
51	TX2N	HDMI_TX2N	HDMI phy TX2 N	O
52	TX2P	HDMI_TX2P	HDMI phy TX2 P	O
53	TX1N	HDMI_TX1N	HDMI phy TX1 N	O
54	TX1P	HDMI_TX1P	HDMI phy TX1 P	O
55	TX0N	HDMI_TX0N	HDMI phy TX0 N	O
56	TX0P	HDMI_TX0P	HDMI phy TX0 P	O
57	TXCN	HDMI_TXCN	HDMI phy TX clock N	O
58	TXCP	HDMI_TXCP	HDMI phy TX clock P	O
59	B0	RGB_DATA0/GPF0_4	OR VEN_DATA0	I/O
60	B1	RGB_DATA1/GPF0_5	OR VEN_DATA1	I/O
61	B2	RGB_DATA2/GPF0_6	OR VEN_DATA2	I/O
62	B3	RGB_DATA3/GPF0_7	OR VEN_DATA3	I/O
63	B4	RGB_DATA4/GPF1_0	OR VEN_DATA4	I/O
64	B5	RGB_DATA5/GPF1_1	OR VEN_DATA5	I/O
65	B6	RGB_DATA6/GPF1_2	OR VEN_DATA6	I/O
66	B7	RGB_DATA7/GPF1_3	OR VEN_DATA7	I/O
67	G0	RGB_DATA8/GPF1_4	OR V656_DATA0	I/O
68	G1	RGB_DATA9/GPF1_5	OR V656_DATA1	I/O
69	G2	RGB_DATA10/GPF1_6	OR V656_DATA2	I/O
70	G3	RGB_DATA11/GPF1_7	OR V656_DATA3	I/O
71	G4	RGB_DATA12/GPF2_0	OR V656_DATA4	I/O
72	G5	RGB_DATA13/GPF2_1	OR V656_DATA5	I/O
73	G6	RGB_DATA14/GPF2_2	OR V656_DATA6	I/O
74	G7	RGB_DATA15/GPF2_3	OR V656_DATA7	I/O
75	R0	RGB_DATA16/GPF2_4		I/O
76	R1	RGB_DATA17/GPF2_5		I/O
77	R2	RGB_DATA18/GPF2_6		I/O
78	R3	RGB_DATA19/GPF2_7		I/O
79	R4	RGB_DATA20/GPF3_0		I/O
80	R5	RGB_DATA21/GPF3_1		I/O
81	R6	RGB_DATA22/GPF3_2		I/O
82	R7	RGB_DATA23/GPF3_3		I/O
83	VSYNC	RGB_VS/GPF0_1	Vertical sync signal for RGB or VEN	I/O
84	HSYNC	RGB_HS/GPF0_0	Horizontal sync signal for RGB or VEN	I/O
85	DOTCLK	RGB_CLK/GPF0_3	Video clock for RGB or V601	I/O
86	DE	RGB_VDEN/GPF0_3	RGB_DE or VEN_HREF	I/O

Pin	Signal name	Function	Description	IO Type
87	TOUT0	TOUT0/GPD0_0	PWM time out	I/O
88	EINT22	EINT22/GPH2_6	OR KP_COL6	I/O
89	EINT23	EINT23/GPH2_7	OR KP_COL7	I/O
90	TVOUT	XDACOUT	Analog output of Video DAC	O
91	EINT24	EINT24/GPH3_0	OR KP_ROW0	I/O
92	EINT25	EINT25/GPH3_1	OR KP_ROW1	I/O
93	I2S1LRCK	AC97SYNC/I2S1LRCK	Audio interface CH1	I/O
94	I2S1SCLK	AC97BCK/I2S1SCLK	Audio interface CH1	I/O
95	I2S1SDI	AC97SDI/I2S1SDI	Audio interface CH1	I/O
96	I2S1SDO	AC97SDO/I2S1SDO	Audio interface CH1	I/O
97	I2S1CDCLK	AC97RST/I2S1CDCLK	Audio interface CH1	I/O
98	EINT26	EINT26/GPH3_2	OR KP_ROW2	I/O
99	EINT27	EINT27/GPH3_3	OR KP_ROW3	I/O
100	TXD3	TXD3/RTSn2/GPA1_3	Uart 3 transmits data output	I/O
101	RXD3	RXD3/CTSn2/GPA1_2	Uart 3 receives data input	I/O
102	TXD2	TXD2/GPA1_1	Uart 2 transmits data output	I/O
103	RXD2	RXD2/GPA1_0	Uart 2 receives data input	I/O
104	RTSn1	RTSn1/GPA0_7	Uart 1 request to send output signal	I/O
105	CTSn1	CTSn1/GPA0_6	Uart 1 clean to send input signal	I/O
106	TXD1	TXD1/ GPA0_5	Uart 1 transmits data output	I/O
107	RXD1	RXD1/GPA0_4	Uart 1 receives data input	I/O
108	RTSn0	RTSn0/GPA0_3	Uart 0 request to send output signal	I/O
109	CTSn0	CTSn0/GPA0_2	Uart 0 clean to send input signal	I/O
110	TXD0	TXD0/ GPA0_1	Uart 0 transmits data output	I/O
111	RXD0	RXD0/GPA0_0	Uart 0 receives data input	I/O
112	SPIMOSI0	SPI0_MOSI/GPB3	SPI CH0 master output / slave input	I/O
113	SPIMISO0	SPI0_MISO/GPB2	SPI CH0 master input / slave output	I/O
114	SPICS0	SPI0_CS/GPB1	SPI CH0 chip select	I/O
115	SPICLK0	SPI0_CLK/GPB0	SPI CH0 clock	I/O
116	EINT28	EINT28/GPH3_4	OR KP_ROW4	I/O
117	EINT29	EINT29/GPH3_5	OR KP_ROW5	I/O
118	EINT30	EINT30/GPH3_6	OR KP_ROW6	I/O
119	EINT31	EINT31/GPH3_7	OR KP_ROW7	I/O
120	EINT0	EINT0/GPH0_0		I/O
121	EINT1	EINT1/GPH0_1		I/O
122	YDATA7	CAM_DATA7/GPE1_2	Camera A data 7 in	I/O
123	YDATA6	CAM_DATA6/GPE1_1	Camera A data 6 in	I/O
124	YDATA5	CAM_DATA5/GPE1_0	Camera A data 5 in	I/O
125	YDATA4	CAM_DATA4/GPE0_7	Camera A data 4 in	I/O
126	YDATA3	CAM_DATA3/GPE0_6	Camera A data 3 in	I/O
127	YDATA2	CAM_DATA2/GPE0_5	Camera A data 2 in	I/O
128	YDATA1	CAM_DATA1/GPE0_4	Camera A data 1 in	I/O

Pin	Signal name	Function	Description	IO Type
129	YDATA0	CAM_DATA0/GPE0_3	Camera A data 0 in	I/O
130	YPCLK	CAM_PCLK/GPPE0_0	Camera A clock in	I/O
131	YCLKO	CAM_CLKEN/GPE1_3	Master clock to dirver Camera	I/O
132	YVSYNC	CAM_VS/GPE0_1	Camera A VSYNC in	I/O
133	YHREF	CAM_HREF/GPE0_2	Camera A HSYNC in	I/O
134	YRST	CAM_FIELD/GPE1_4	Reset or Power down Camera	I/O
135	SDA1	IIC-bus CH1 data	Defaulted on HDMI DDC SDA	I/O
136	SCL1	IIC-bus CH1 clock	Defaulted on HDMI DDC SCL	I/O
137	DATA15	EBI_DATA15/MP07_7	Memory port0 Data bus	I/O
138	DATA14	EBI_DATA14/MP07_6	Memory port0 Data bus	I/O
139	DATA13	EBI_DATA13/MP07_5	Memory port0 Data bus	I/O
140	DATA12	EBI_DATA12/MP07_4	Memory port0 Data bus	I/O
141	DATA11	EBI_DATA11MP07_3	Memory port0 Data bus	I/O
142	DATA10	EBI_DATA10/MP07_2	Memory port0 Data bus	I/O
143	DATA9	EBI_DATA9/MP07_1	Memory port0 Data bus	I/O
144	DATA8	EBI_DATA8/MP07_0	Memory port0 Data bus	I/O
145	DATA7	EBI_DATA7/MP06_7	Memory port0 Data bus	I/O
146	DATA6	EBI_DATA6/MP06_6	Memory port0 Data bus	I/O
147	DATA5	EBI_DATA5/MP06_5	Memory port0 Data bus	I/O
148	DATA4	EBI_DATA4/MP06_4	Memory port0 Data bus	I/O
149	DATA3	EBI_DATA3/MP06_3	Memory port0 Data bus	I/O
150	DATA2	EBI_DATA2/MP06_2	Memory port0 Data bus	I/O
151	DATA1	EBI_DATA1/MP06_1	Memory port0 Data bus	I/O
152	DATA0	EBI_DATA0/MP06_0	Memory port0 Data bus	I/O
153	OEn	EBI_OEn/MP01_6	Memory port0 SROM Output Enable	I/O
154	WEn	EBI_WEn/MP01_7	Memory port0 SROM Write Enable	I/O
155	CSn1	SROM_CSn1/MP01_1	Memory port0 SROM Chip Select	I/O
156	EINT10	EINT10/GPH1_2		I/O
157	ADDR2	EBI_ADDR2/MP04_2	Memory Port0 Address bus	O
158	nRESET	RESET OUT		O
159	EINT2	EINT2/GPH0_2		I/O
160	OM5	OM1: 1, Others: 0		I
161	OM3	Boot in Nand Flash		I
162	OM2	OM2/3: 1, Others: 0		I
163	OM1	Boot in SD0		I
164	EINT3	EINT3/GPH0_3		I/O
165	EINT4	EINT4/GPH0_4		I/O
166	EINT5	EINT5/GPH0_5		I/O
167	RST_KEY	RESET KEY IN	Connect to Reset button	I
168	EINT6	EINT6/GPH0_6		I/O
169	AIN1	12bit ADC CH1 input		I
170	AIN0	12bit ADC CH0 input		I

Pin	Signal name	Function	Description	IO Type
171	GND	Ground		P
172	GND	Ground		P
173	GND	Ground		P
174	GND	Ground		P
175	GND	Ground		P
176	GND	Ground		P
177	GND	Ground		P
178	GND	Ground		P
179	GND	Ground		P
180	GND	Ground		P

1.6 Multiplexed GPIO

Pin	Signal name	Function 1	Function 2	Function 3
87	TOUT0	TOUT0	GPD0_0	

This pin is 32bit PWM timer output, use for LCD backlight brightness control.

Pin	Signal name	Function 1	Function 2	Function 3
45	EINT16	EINT16	GPH2_0	KP_COL0
46	EINT17	EINT17	GPH2_1	KP_COL1
47	EINT18	EINT18	GPH2_2	KP_COL2
48	EINT19	EINT19	GPH2_3	KP_COL3
49	EINT20	EINT20	GPH2_4	KP_COL4
50	EINT21	EINT21	GPH2_5	KP_COL5
88	EINT22	EINT22	GPH2_6	KP_COL6
89	EINT23	EINT23	GPH2_7	KP_COL7
91	EINT24	EINT24	GPH3_0	KP_ROW0
92	EINT25	EINT25	GPH3_1	KP_ROW1
98	EINT26	EINT26	GPH3_2	KP_ROW2
99	EINT27	EINT27	GPH3_3	KP_ROW3
116	EINT28	EINT28	GPH3_4	KP_ROW4
117	EINT29	EINT29	GPH3_5	KP_ROW5
118	EINT30	EINT30	GPH3_6	KP_ROW6
119	EINT31	EINT31	GPH3_7	KP_ROW7

These pins are external interrupt and use to wake up. EINT12 default as HDMI_CEC. EINT13 default as HDMI_HPD.

Pin	Signal name	Function 1	Function 2	Function 3
100	TXD3	TXD3	GPA1_3	RTSn2
101	RXD3	RXD3	GPA1_2	CTSn2

102	TXD2	TXD2	GPA1_1	
103	RXD2	RXD2	GPA1_0	
104	RTSn1	RTSn1	GPA0_7	
105	CTSn1	CTSn1	GPA0_6	
106	TXD1	TXD1	GPA0_5	
107	RXD1	RXD1	GPA0_4	
108	RTSn0	RTSn0	GPA0_3	
109	CTSn0	CTSn0	GPA0_2	
110	TXD0	TXD0	GPA0_1	
111	RXD0	RXD0	GPA0_0	

UARTs, All CH supports both IR transmission and reception.

Pin	Signal name	Function 1	Function 2	Function 3
135	SDA1	I2C1_SDA	GPD1_2	
136	SCL1	I2C1_SCL	GPD1_3	

I2C CH1 default as HDMI DDC. Other devices can be simulated by GPIOs.

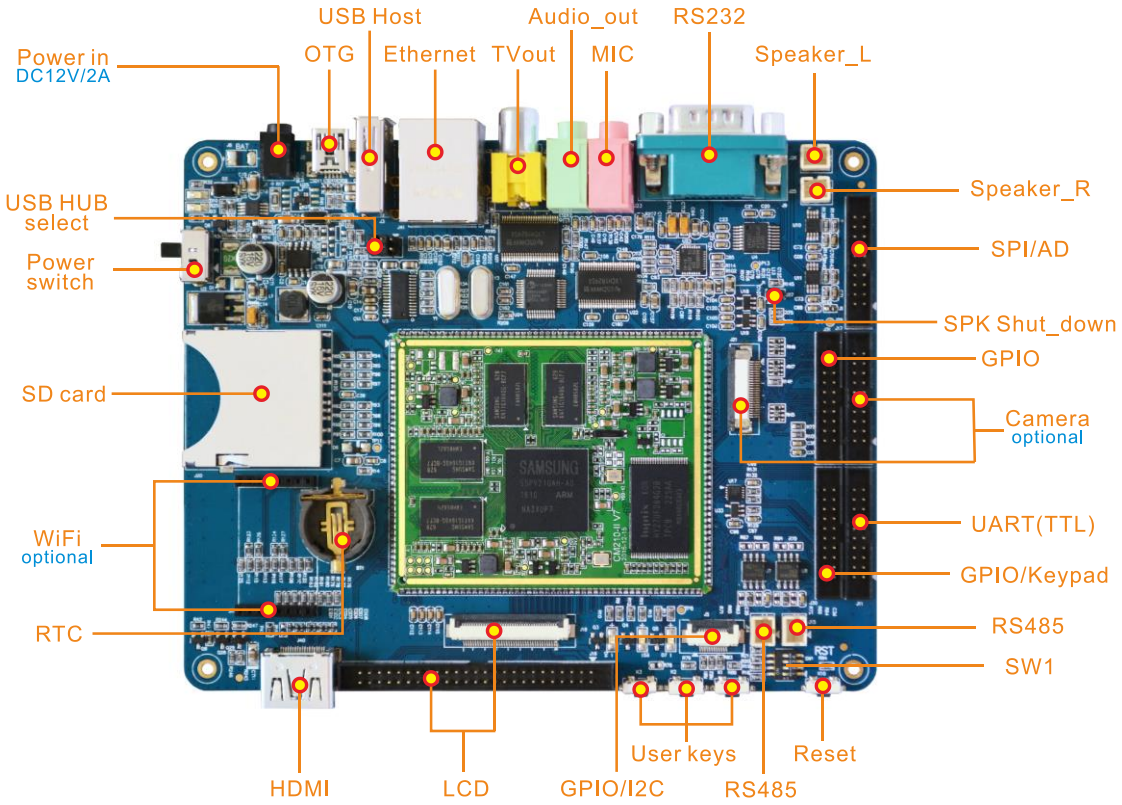
Pin	Signal name	Function 1	Function 2	Function 3	Function 4
93	I2S1LRCK	AC97SYNC1	I2S1LRCK	PCM1FSYNC	GPC2
94	I2S1SCLK	AC97BCK1	I2S1SCLK	PCM1SCLK	GPC0
95	I2S1SDI	AC97SDI1	I2S1SDI	PCM1SIN	GPC3
96	I2S1SDO	AC97SDO1	I2S1SDO	PCM1SOUT	GPC4
97	I2S1CDCLK	AC97RST1	I2S1CDCLK	PCM1EXTCLK	GPC1

Audio codec interface.

Pin	Signal name	Function 1	Function 2	Function 3
112	SPIDI0	SPI0_MOSI	GPB3	
113	SPIDO0	SPI0_MISO	GPB2	
114	SPICS0	SPI0_CS	GPB1	
115	SPICLK0	SPI0_CLK	GPB0	

SPI interface.

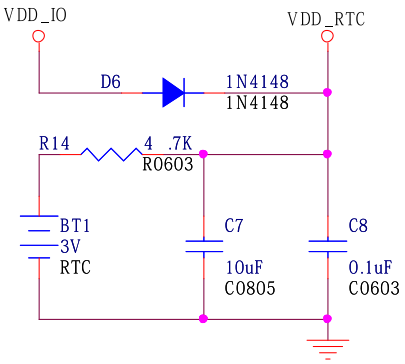
1.7 Development Kit (Android210)



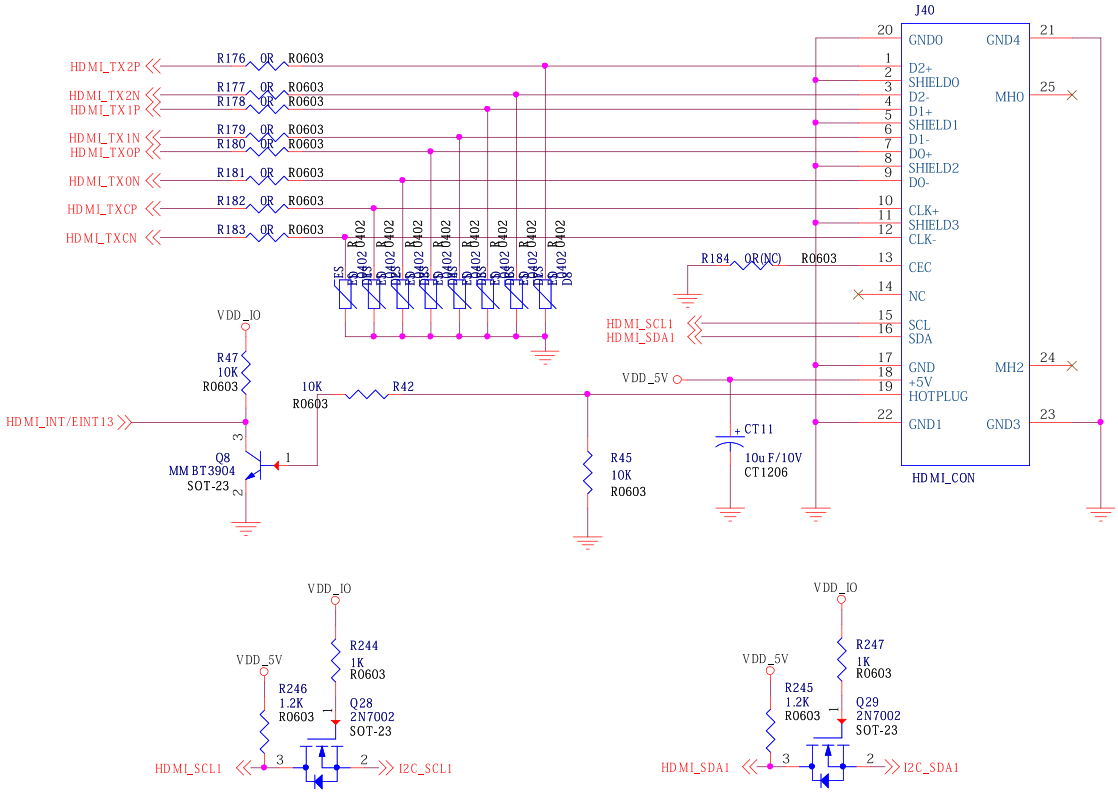
2 Hardware Design Guide

2.1 Peripheral Circuit Reference

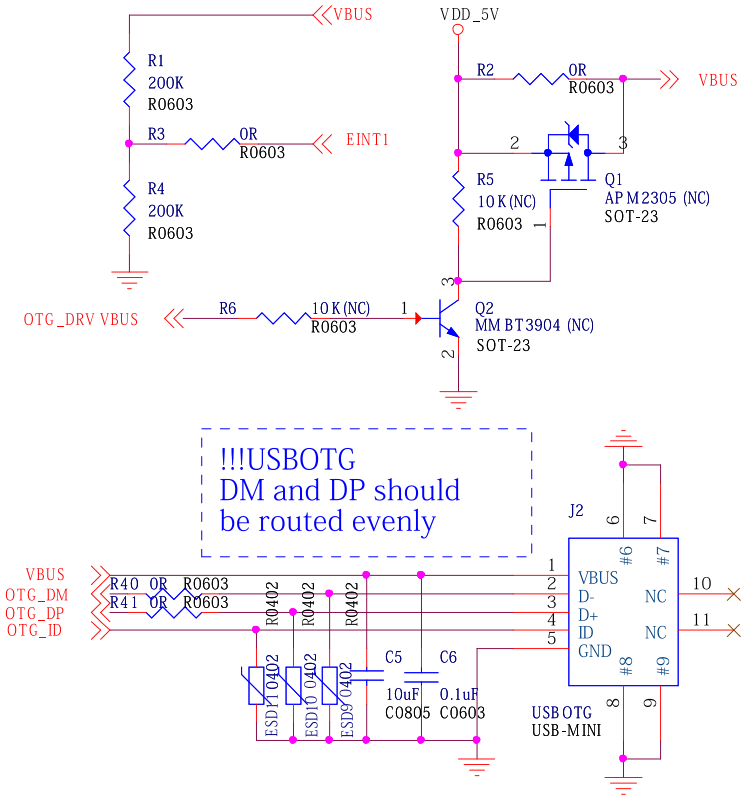
2.1.1 RTC Battery Circuit



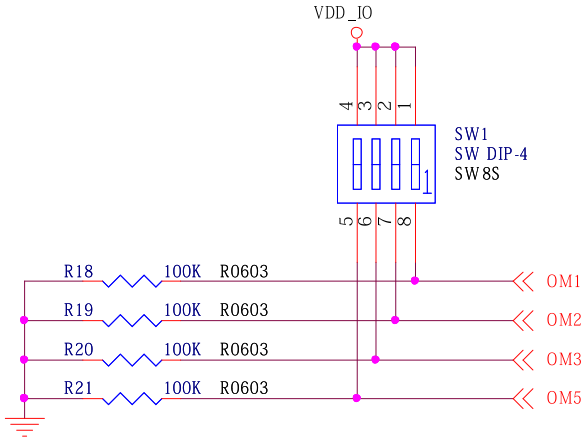
2.1.2 HDMI Interface Circuit



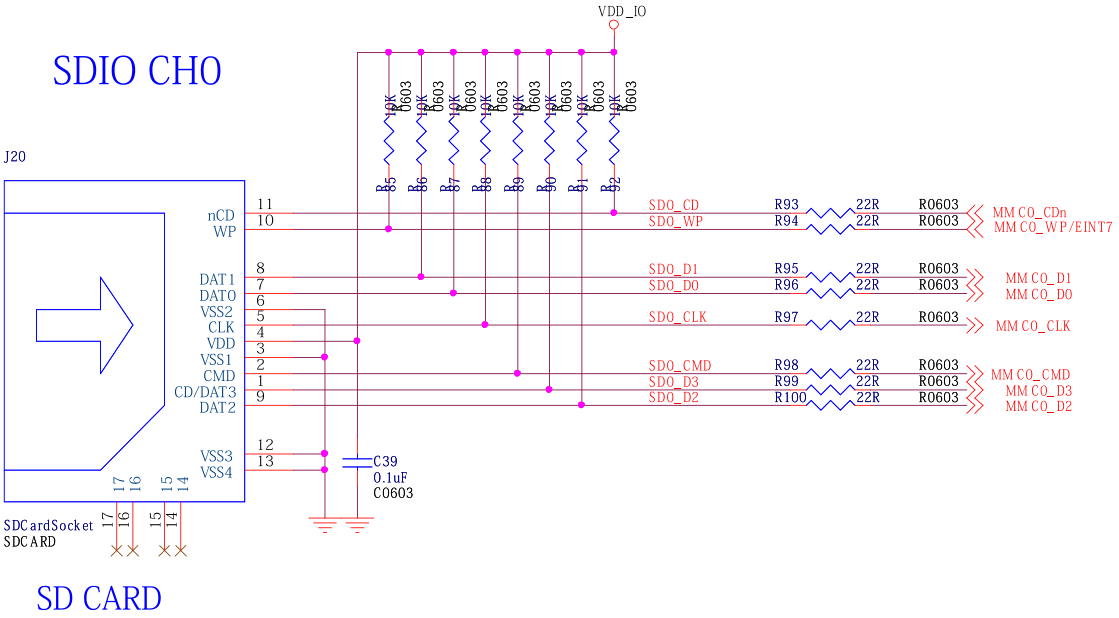
2.1.3 OTG Interface Circuit



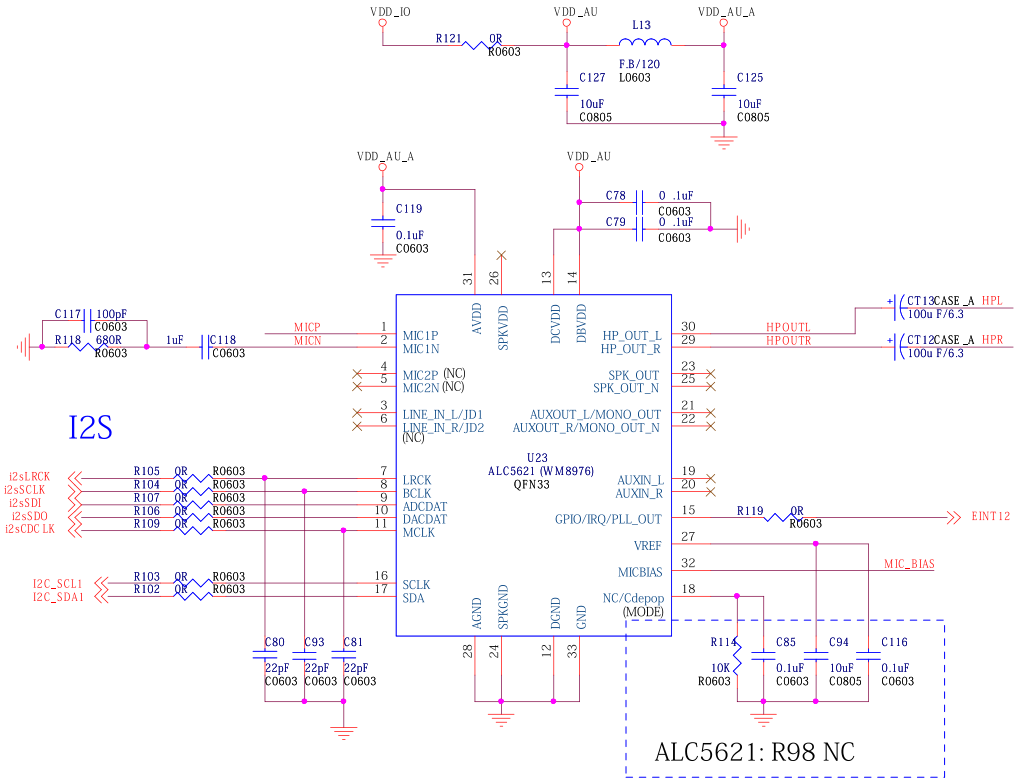
2.1.4 OM Setting Circuit



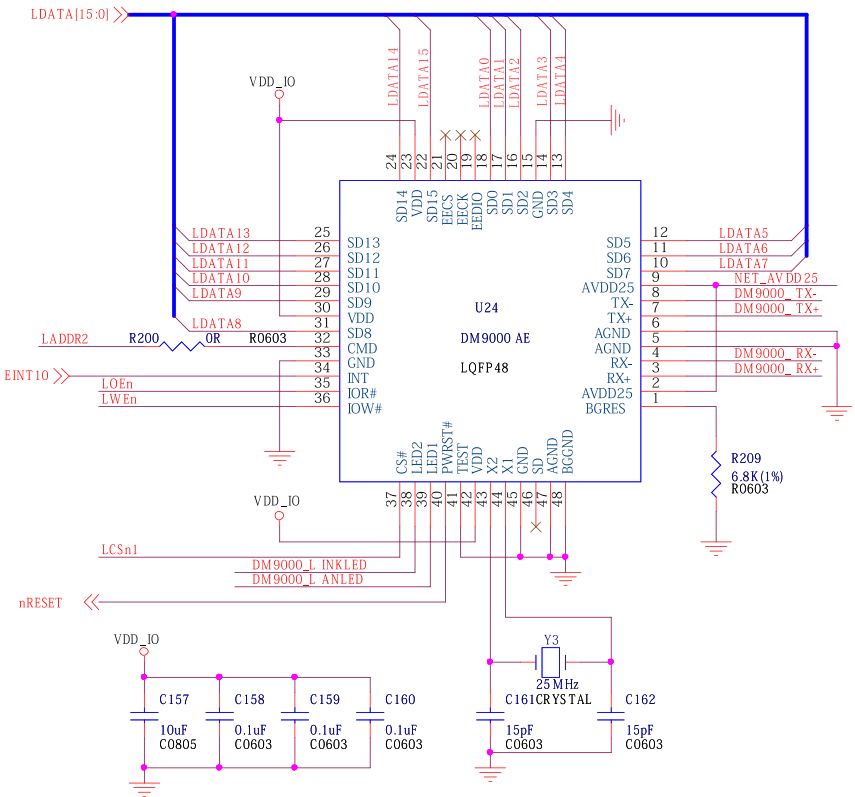
2.1.5 SD0 Interface Circuit



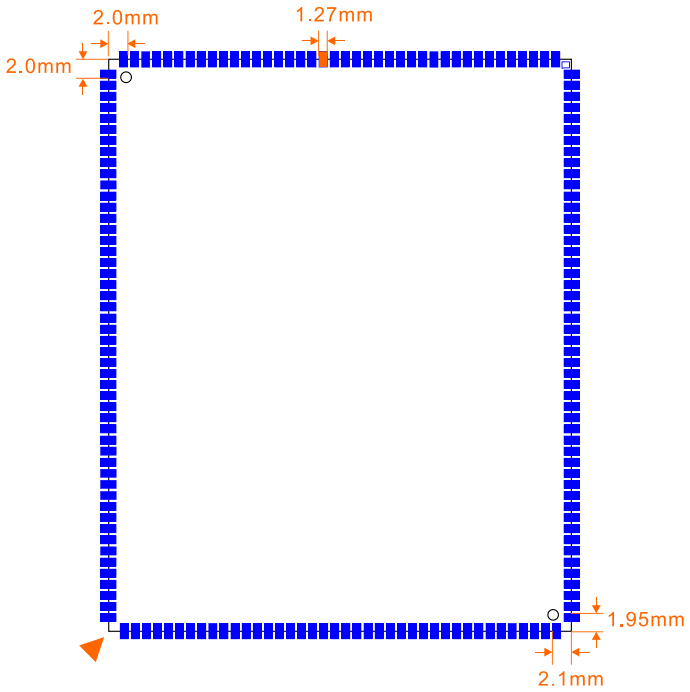
2.1.6 Audio Codec Circuit



2.1.7 Ethernet Interface Circuit



2.2 PCB Footprint



3 Product Electrical Characteristics

3.1 Dissipation and Temperature

Symbol	Parameter	Min	Typ	Max	Unit
DC5V	Module Supply Voltage	3.6	5	5.5	V
VDD_IO	IO Supply Voltage	3.3-5%	3.3	3.3+5%	V
Vrvpp	Max ripple Voltage			0.15	V
Idmax	DC5V Max Input Current		310	350	mA
Ipmax	VDD_IO Max Current		45	55	mA
VCC_RTC	RTC Battery Voltage	1.7	3	3.6	V
Irtc	RTC Input Current			10	uA
Ta	Operating Temperature	0		70	°C
Tstg	Storage Temperature	-40		85	°C

3.2 Reliability of Test

High Temperature Operating Test		
Contents	Operating 8h in high temperature	55°C±2°C
Result	Pass	

Operating Life Test		
Contents	Operating in room	120h
Result	Pass	